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Estimated Minimum Savings to the Medicaid Budget in Missouri by Implementing a Primary Seat Belt Law

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15. Supplementary Notes <p>A 2003 study estimated that if all States had primary laws from 1995 to 2002, over 12,000 lives would have been saved. Failure to implement a primary belt law creates a real cost to a State's budget for Medicaid and other State medical expenditures. This study estimates the minimum dollars Missouri can expect to save on direct medical costs (primarily paid through Medicaid) by the implementation of a primary seat belt law. The current study analyzed at Missouri's 2005 Hospital Discharge Data, including only cases where the external cause of injury was a motor vehicle crash. The total estimated costs to Medicaid, including Traumatic Brain Injury and Spinal Cord Injury costs, from motor vehicle crashes for the first year the injury was incurred for Missouri was \$132.6 million. For subsequent years, the cost is \$30.7 million.</p> <p>In 2005, Missouri's belt use rate was 77.4%. Based on a 40% belt use conversion rate for implementing a primary law, belt use could be expected to increase by 9.04% in Missouri. The Federal government also reimburses a portion of States' Medicaid expenditures and the 2005 reimbursement rate for Missouri was 61.6%. Accounting for this reimbursement, the first year after implementing a primary law Missouri could save \$2.3 million. In terms of cumulative savings, over the next 10 years, Missouri can expect to save at least \$46.8 million on their annual budget in medical costs alone by implementing a primary seat belt law in 2007.</p>			
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INTRODUCTION

On Saturday, January 15, 2005, at 11:16 a.m., a 28-year-old man was driving unbelted on an urban arterial road in Kansas City, Missouri. He was hit by a vehicle driven by a 25-year-old belted man. The unbelted 28-year-old man died; the 25-year-old man wearing his seat belt survived.

On Monday April 11, 2005, at 4:35 p.m., a 22-year-old male was driving on SR-95 in Mountain Grove, Missouri, when he was involved in a collision. The other vehicle was driven by a 66-year-old female. The young man, belted, survived. The woman, not wearing a seat belt, died.

On Friday March 25, 2005, at 2:32 p.m., two vehicles were involved in a crash on SR-B in Henry County, Missouri. The driver of one vehicle, an unbelted 18-year-old female, was killed. Her 18-year-old male passenger, belted, survived. The other vehicle's driver, a 77-year-old male wearing his seat belt, survived.

On Friday October 7, 2005, at 3:20 p.m., two vehicles were traveling on an urban local street in St. Louis, Missouri. The driver of the first vehicle, an unbelted 52-year-old woman, died. The driver of the other vehicle was a 16-year-old female. The young woman and her 15-year-old female passenger, both properly restrained, survived.

Seat belts can reduce the risk of death for front seat occupants of passenger cars by 45%. Similarly, belt use reduces the risk of serious non-fatal injuries by 50% for front seat occupants of passenger cars. Belts are associated with a 60% decreased risk of injury while in light trucks (e.g. SUVs, minivans, and pickup trucks) ¹.

There are two types of belt laws. Primary or "standard enforcement" seat belt laws allow police officers to enforce a violation of a seat belt law after observing a belt use infraction by itself. That is, the police can treat a seat belt violation as they would any other violation. Secondary laws prevent police from enforcing the belt law unless it is observed in association with another violation. That is, if the belt violation is the only visible infraction, police are not allowed to enforce the law.

According to the National Highway Traffic Safety Administration, the passage of primary seat belt laws would likely induce 40% of current non-users to wear seat belts. One study by the National Safety Council estimated that had all States had primary laws from 1995 to 2002 more than 12,000 lives would have been saved ².

Additionally, there is a real cost to the State's budget in terms of Medicaid and other State medical expenditures associated with failure to implement a primary seat belt law. Specifically, this study estimates the *minimum* dollars Missouri can expect to save on direct medical costs (primarily paid through Medicaid) by the implementation of a primary seat belt law.

METHODS

Missouri's 2005 Hospital Discharge Data were used for the analyses. Only cases where the external cause of injury was a motor vehicle crash were included. There were 7,901 such patients discharged from Missouri hospitals in 2005. The cost of these Motor Vehicle generated injuries was \$321,525,990 in direct hospital costs alone. Of that, \$75,713,909 was costs billed to the State of Missouri as Medicaid and other sources paid directly by the State.

Of the 7,901 patients discharged, 2,698 injuries were classified as Traumatic Brain Injuries (TBI) and/or Spinal Cord Injuries (SCI). These particular injuries are likely to lead to long-term post-hospitalization medical costs. That is, the costs continue over an injured person's lifetime. These costs cannot be looked at over a single year but need to be accumulated annually to gain an understanding of their financial impact to the state. Injuries occurring this year will cost taxpayers money next year on top of the injuries occurring next year. In three years time, the costs will be for both the prior two years' injuries plus that year's injuries.

TBI Cost Estimates

The long-term direct medical costs for various types of injuries differ greatly. None of our estimates includes peripheral costs such as lost wages and productivity. Post-hospitalization TBI costs per person are estimated at \$40,000 (for rehab and other medical costs) during the first year (according to the Craig Hospital³). Additional year costs were estimated from the National Institute of Health values pertaining to traumatic brain injuries, lifetime costs for such injuries and average lifespan of people with TBI. The average direct medical cost (beyond the first year) was estimated to be \$26,871 per person per year (in addition to initial direct hospital costs). Having a TBI lessens life expectancy by an average of 7 years⁴.

SCI Cost Estimates

SCI costs were based on the University of Alabama's National Spinal Cord Injury Statistical Center report showing first year cost per injury severity and additional year costs per injury severity. These costs were matched, using ICD-9 codes, to the injured persons in the Missouri Hospital Discharge Database to estimate the costs for spinal cord injured individuals (See Table 1 for post-discharge costs). Note that the costs indicated in table 1 are *per injury*. It is only in a minority of cases that life expectancy is less than 10 years for SCI survivors; in fact, 85% of SCI patients who survive the first 24 hours are still alive 10 years later^{5,6}.

Table 1: Average Yearly Expenses

<u>Injury Severity</u>	<u>First year</u>	<u>Each year thereafter</u>
High Quadriplegia	\$741,425	\$132,807
Low Quadriplegia	\$478,782	\$54,400
Paraplegia	\$270,913	\$27,568
Incomplete motor function at any level	\$218,504	\$15,313

Source: The National SCI Statistical Center⁵

Medicaid Estimates

Estimating the percentage of TBI and SCI patients who are likely to become Medicaid recipients is difficult. The Craig Hospital showed that the proportion of those with TBI on Medicaid doubles in the year following injury. For SCI, one estimate is that there is a 24% increase in Medicaid-covered patients from the time of injury to the time of release from the hospital. That is, according to the Missouri Model Spinal Cord Injury Center⁷, 25% of SCI patients were covered by Medicaid at the time of injury and this figure increased to 31% upon release from the

acute care facility (for SCI, the average length of stay in the acute care unit is 18 days⁵). Furthermore, the Craig Hospital estimates that 25.4% of all SCI will become Medicaid patients. Specifically, this was the percentage of SCI persons on Medicaid five years after injury.

RESULTS

There were 517 TBI patients on Medicaid discharged from Missouri hospitals in 2005. Twenty-three of these died, contributing only acute hospital care costs. Their actual hospital charges were \$34,249,452. The remainder generated the acute care cost and the \$40,000 per person estimated first year additional health care cost. Furthermore, there is expected to be another \$26,871 per person for each additional year post injury. Thus, the cost to Medicaid for the first year is estimated at about \$54 million with each additional year (assuming the percentage on Medicaid doubles as per the Craig Hospital) adding about \$26.5 million (See Table 2).

There were 52 SCI patients on Medicaid discharged from Missouri Hospitals in 2005. Their actual hospital charges were \$7,367,409. In total, there were 189 patients with SCI stemming from motor vehicle crashes (3 died). We estimated that, post-hospitalization, an additional 24% of these survivors would become Medicaid recipients, and that 25.4% would be on Medicaid in the years following. Thus, using estimated medical expenditures (see Table 1) the costs to Medicaid would be about \$44.5 million in the first year and \$4.1 million each year thereafter (see Table 2). One and a half percent of the additional year cost (see Table 2) of SCI was subtracted for each subsequent year in order to account for the 85% survival rate after 10 years (assuming a linear change).

Additionally, there were \$34.1 million in non-TBI/SCI injury costs billed directly to Medicaid or the State (See Table 2).

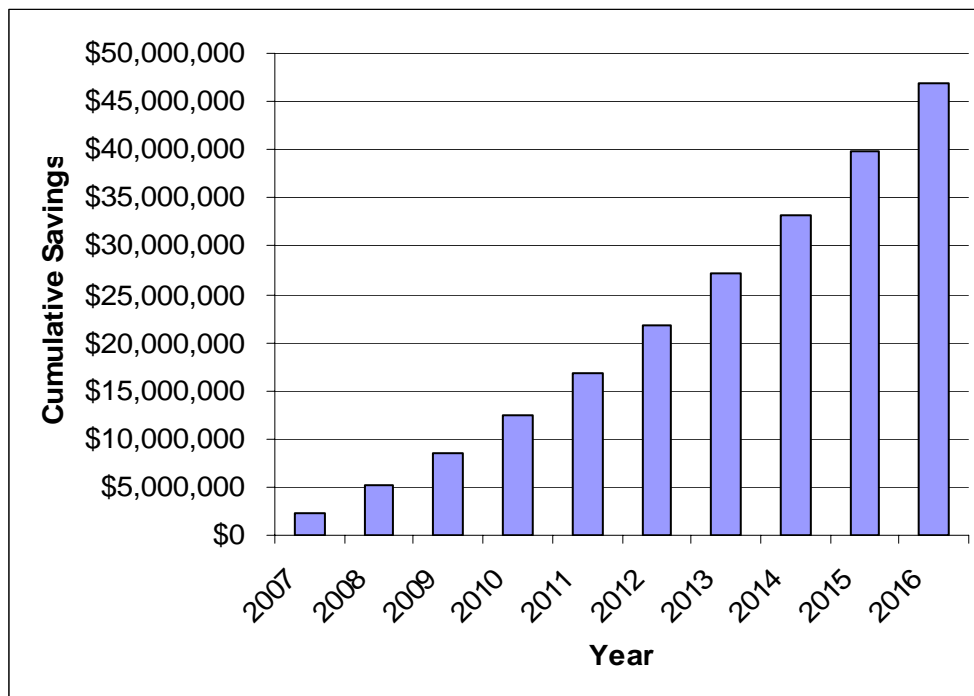
	Year 1	Each additional year
Traumatic Brain Injury	\$54,009,452	\$26,548,548
Spinal Cord Injury	\$44,529,789	\$4,120,927
Other	\$34,097,048	
Total	\$132,636,289	\$30,669,475
Saved By Primary Law	\$2,302,142	\$532,324

The total first year cost to the State of Missouri for motor vehicle crashes is therefore \$132.6 million for the first year and \$30.7 million for each year after. According to NHTSA, a primary law would likely convert 40% of the non-belt users to belt users. In 2005, Missouri's seat belt use rate was 77.4%. Based on the conversion rate one would expect belt use to increase by 9.04% and of those newly belted individuals, at least 50% would avoid injury (based on seat belt effectiveness in reducing injury). However, the Federal Government reimburses States a portion of their Medicaid expenditures. The 2005 reimbursement rate for Missouri was 61.60%. Accounting for this reimbursement, the first year savings to the State by implementation of a primary seat belt law would be about \$2.3 million dollars. By the fifth year the savings would be \$4.4 million for that year alone (see Table 3).

Year	Values	\$ Saved
2007	Acute \$	\$2,302,142
2008	Acute \$ + Prior 1 Years LT\$	\$2,833,393
2009	Acute \$ + Prior 2 Years LT\$	\$3,363,571
2010	Acute \$ + Prior 3 Years LT\$	\$3,892,676
2011	Acute \$ + Prior 4 Years LT\$	\$4,420,708
2012	Acute \$ + Prior 5 Years LT\$	\$4,947,668
2013	Acute \$ + Prior 6 Years LT\$	\$5,473,554
2014	Acute \$ + Prior 7 Years LT\$	\$5,998,368
2015	Acute \$ + Prior 8 Years LT\$	\$6,522,109
2016	Acute \$ + Prior 9 Years LT\$	\$7,044,777

Considering the cumulative savings (adding up each year's savings), the State could expect to have saved \$16.8 million in the first 5 years and \$46.8 million over 10 years (See Figure 1).

Figure 1. Cumulative Minimum Savings by Implementation of Primary Law in 2007.



CONCLUSION

The estimates reported here are *minimum* savings associated with implementation of a primary seat belt law. In this study, we do not explore the peripheral costs (loss of wages and tax revenues, productivity, loss of life, etc.). Additionally, research has shown that the costs of unbelted injuries are 25% higher than belted injuries⁸ and that unbelted occupants are more likely to be Medicaid patients. Furthermore, the assumption here is that injuries other than TBI or SCI incur no cost beyond immediate direct hospital costs (i.e. possible follow-up treatments such as surgery or physical therapy are absent from our analyses). Accounting for these ancillary expenses would drastically raise the estimates presented here.

There is also no attempt to project cost increase over time. Medical cost increases have traditionally far outpaced inflation. Costs reported here are merely small portions of the likely savings. Clearly, the State can expect to reduce other associated costs by implementation of a primary law. For example, unemployment is much higher among disabled persons and family members frequently need to defer employment to become caretakers. These costs not only reduce the tax base for the State but may also add to the number of persons on other State dependent monies (e.g., welfare). We also do not address the savings to private business and citizens of the State. Lastly, we do not attempt to place a price on human life, pain, and suffering.

All the costs in this study are based on the conservative values. The goal was to produce **an absolute minimum value**. Whenever multiple credible values existed for an estimate, we chose the lowest value.

It should be noted that some of the estimates in this report are different from those stated in previous reports (e.g. Chaudhary & Preusser, 2003). In those earlier documents, figures reported indicated *gross* costs to the State whereas the current document indicates *net* costs to the State. Implementation of a primary seat belt law would promote gross savings (i.e., not considering the Federal Reimbursement) of \$6 million in the first year, \$43.8 million by the fifth year, and \$121.9 million over the next 10 years.

In sum, the State of Missouri could expect to save at least \$46.8 million dollars (\$121.9 million gross) over the next 10 years on its annual budget in medical costs alone by implementing a primary seat belt law in 2007.

References

1. Kahane, C.J. (2000). Fatality reduction by safety belts for front-seat occupants of cars and light trucks: Updated and expanded estimates based on 1986-99 FARS Data. Technical Report: DOT HS 809 199. Washington, DC: National Highway Traffic Safety Administration.
2. Chaudhary, N.K. and Preusser, D.F. (2003). Lives lost by states' failure to implement primary safety belt laws. Report to the National Safety Council. Available: www.nsc.org/public/Preusser_Study.doc
3. Craig Hospital. Available: www.craighospital.org/tbi/doc_costs.asp
4. Craig Hospital. Available: www.craighospital.org/TBI/DOC_Survival_Short.asp
5. National Spinal Cord Injury Statistical Center. Available: www.spinalcord.uab.edu/show.asp?durki=21446
6. Spinal Cord Injury Information Page. Available: www.sci-info-pages.com/facts.html
7. Missouri Model Spinal Cord Injury Center. Available: www.umshp.org/hp/resources/sci/snaps/snaps2a.htm
8. Gill, S.S., Jakub, J.W., Pease, M.C., and Woolen, C.D. (2002). The economic impact of motor vehicle crashes: The cost of restrained versus unrestrained occupants in South Carolina. *The American Surgeon*, 68:569-574

APPENDIX
Calculations**

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
2007	\$132,636,288.80	\$30,607,660.83	\$30,545,846.93	\$30,484,033.03	\$30,422,219.13	\$30,360,405.23	\$30,298,591.33	\$30,236,777.43	\$30,174,963.53	\$30,113,149.62
2008		\$132,636,288.80	\$30,607,660.83	\$30,545,846.93	\$30,484,033.03	\$30,422,219.13	\$30,360,405.23	\$30,298,591.33	\$30,236,777.43	\$30,174,963.53
2009			\$132,636,288.80	\$30,607,660.83	\$30,545,846.93	\$30,484,033.03	\$30,422,219.13	\$30,360,405.23	\$30,298,591.33	\$30,236,777.43
2010				\$132,636,288.80	\$30,607,660.83	\$30,545,846.93	\$30,484,033.03	\$30,422,219.13	\$30,360,405.23	\$30,298,591.33
2011					\$132,636,288.80	\$30,607,660.83	\$30,545,846.93	\$30,484,033.03	\$30,422,219.13	\$30,360,405.23
2012						\$132,636,288.80	\$30,607,660.83	\$30,545,846.93	\$30,484,033.03	\$30,422,219.13
2013							\$132,636,288.80	\$30,607,660.83	\$30,545,846.93	\$30,484,033.03
2014								\$132,636,288.80	\$30,607,660.83	\$30,545,846.93
2014									\$132,636,288.80	\$30,607,660.83
2015										\$132,636,288.80
Total	\$132,636,288.80	\$163,243,949.63	\$193,789,796.56	\$224,273,829.60	\$254,696,048.73	\$285,056,453.95	\$315,355,045.28	\$345,591,822.71	\$375,766,786.24	\$405,879,935.86
Cumulative	\$132,636,288.80	\$295,880,238.43	\$489,670,035.00	\$713,943,864.59	\$968,639,913.32	\$1,253,696,367.27	\$1,569,051,412.56	\$1,914,643,235.27	\$2,290,410,021.50	\$2,696,289,957.36
Saved per year *	\$2,302,141.54	\$2,833,392.58	\$3,363,570.74	\$3,892,676.01	\$4,420,708.38	\$4,947,667.86	\$5,473,554.45	\$5,998,368.15	\$6,522,108.96	\$7,044,776.87
Saved Cumulative	\$2,302,141.54	\$5,135,534.12	\$8,499,104.86	\$12,391,780.87	\$16,812,489.25	\$21,760,157.11	\$27,233,711.56	\$33,232,079.71	\$39,754,188.66	\$46,798,965.53

U = Expected change in unbelted pop. By implementing primary law: 40%

O = Statewide observed belt use (S. 157): 77.4%

C = Expected percent change in population: (U *(1-O))

E = Effectiveness of seat belts to reduce injury: 50%

* = Total * E*C

** Discount rates of .03 and .07 would reduce the 10-year estimate to \$39.4 million and \$31.9 million respectively.

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